INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

HYDRAULIC ENGINEERING LABORATORY								
IV Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACED12	Core	0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: Fluid Mechanics								

I. COURSE OVERVIEW:

Hydraulic Engineering is concerned with the flow and conveyance of fluids in both closed pipes and open channels. The course deals with the principles of fluid mechanics and application of collection, control, transport, measurement, and use of water. First part of the course deals with analysis and design of hydraulic parameters for closed pipes. Latter part emphasis open channel flow, which is governed by the interdependent interaction between the water and the channel, hydraulic structures for various types of the flows to overcome the head losses.

II. COURSE OBJECTIVES:

The students will try to learn:

I. Enrich the concept of fluid mechanics and hydraulic machines
II. Demonstrate the classical experiments in fluid mechanics and hydraulic machinery
III. The fundamentals concepts of an open channel flow, their relationships by applying fluid properties, hydrostatics, and the conservation equations.
IV. Discuss the performance characteristics of turbines and pumps.

III.COURSE OUTCOMES

At the end of the course students should be able to:

CO1 Explain the basic principles of fluid mechanics for determining their properties through various laboratory tests.
CO2 Determine coefficient of discharge for measuring actual discharge using different discharge measuring device.
CO3 Measure friction factor of pipe for calibration of losses in pipes.
CO4 Show impact of jet on vanes and study of hydraulic jump for finding the impact on both flat and curved surfaces and analyzing hydraulic jump in open channel flow
CO5 Analyze the various algorithms used in the prediction and perception of things in an intelligent environment
CO6 Demonstrate performance test of various turbines and pumps for evaluating the speed and energy required in running any hydro-electric scheme.

I. COURE CONTENT:

Week-l: INTRODUCTION TO FLUID MECHANICS AND HYDRAULIC MACHINES LAB
Introduction to Fluid Mechanics and Hydraulic Machinery laboratory.

Week-2: DETERMINATION OF FRICTION FACTOR OF CIRCULAR AND NON – CIRCULAR PIPES
Determination of friction factor of circular and non – circular pipes.

Week-3: CALIBRATION OF RECTANGULAR NOTCH
Determination of Co-efficient of discharge through rectangular notch.

Week-4: CALIBRATION OF TRIANGULAR NOTCH
Determination of Co-efficient of discharge through triangular notch.

Week-5: CALIBRATION OF TRAPEZOIDAL NOTCH
Determination of Co-efficient of discharge through trapezoidal notch.

Week-6: VERIFICATION OF BERNOULLI'S EQUATION FOR HORIZONTAL PIPE
Verification of Bernoulli _s equation for horizontal pipe.

Week-7: IMPACT OF JET ON VANES (FLAT VANE)
Determination of Co-efficient of impact due to jet on flat vane.

Week-8: IMPACT OF JET ON VANES (CURVED VANE)
Determination of Co-efficient of impact due to jet on curved vanes.

Week-9: PERFORMANCE TEST ON PELTON TURBINE
Determination of the efficiency of Pelton Wheel turbine.

Week-10: PERFORMANCE TEST ON REACTION TURBINE (FRANCIS)
Determination of the efficiency of either Francis turbine.

Week-11: PERFORMANCE TEST ON REACTION TURBINE (KAPLAN TURBINE)
Determination of the efficiency of either Kaplan turbine.

Week-12: PERFORMANCE TEST ON SINGLE STAGE CENTRIFUGAL PUMP
Determination of the maximum efficiency of single stage centrifugal pump.

Week-13: PERFORMANCE TEST ON MULTI STAGE CENTRIFUGAL PUMP
Determination of the maximum efficiency of multi stage centrifugal pump.

Week-14: PERFORMANCE TEST ON SINGLE ACTING RECIPROCATING PUMP
Determination of the maximum efficiency of single acting reciprocating pump.

V. TEXT BOOKS:

1. C.S. P.Ojha, R. Berndtsson and P. N. Chandarmouli, '*Fluid Mechanics and Machinery*', Oxford University Press, 2010
2. P M Modi and S M Seth, '*Hydraulics and Fluid Mechanics*', Standard Book House.
3. K. Subramanya, '*Theory and Applications of Fluid Mechanics*', Tata McGraw Hill.
4. R.L. Daugherty, J.B. Franzini and E.J. Finnemore, '*Fluid Mechanics with Engineering Applications*', International, Student Edition, Mc Graw Hill.

VI. WEB REFERENCES:

1. http://site.iugaza.edu.ps/mymousa/files/Fluid-Mechanics-and-Hydraulics-Lab-Manual-2015-.pdf
2. http://www.public.asu.edu/~lwmays/classes/cee341/manual.pdf
3. https://issuu.com/loisburchette4023/docs/fluid-mechanics-lab-manual-for-mech.

VII. Electronics References

1. https://issuu.com/loisburchette4023/docs/fluid-mechanics-lab-manual-for-mech

VIII. Materials Online

1. Course template
2. Lab manual